STGW30NC60W

N-CHANNEL 30A - 600V - TO-247
Ultra FAST Switching PowerMESH™ IGBT

Target Specification

General features

Type	V_{CES}	$V_{CE(sat)}$ (Max)@ 25°C	I_C @100°C
STGW30NC60W	600 V	< 2.5 V	30 A

- VERY LOW OFF LOSSES INCLUDING TAIL CURRENT
- LOWER C_{RES} / C_{IES} RATIO
- LOSSES INCLUDE DIODE RECOVERY ENERGY
- HIGH FREQUENCY OPERATION
- VERY SOFT ULTRA FAST RECOVERY ANTI PARALLEL DIODE

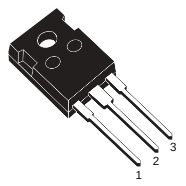
Description

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix “W” identifies a family optimized for very high frequency application.

Applications

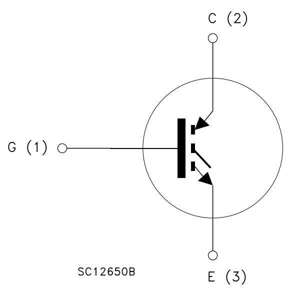
- HIGH FREQUENCY INVERTERS, UPS, MOTOR DRIVERS
- HF, SMPS and PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES

Package



TO-247

Internal schematic diagram



Order codes

Sales Type	Marking	Package	Packaging
STGW30NC60W	W30NC60W	TO-247	TUBE

This is a preliminary information on a new product foreseen to be developed. Details are subject to change without notice

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	600	V
I_C	Collector Current (continuous) at 25°C (#)	60	A
I_C	Collector Current (continuous) at 100°C (#)	30	A
V_{ECR}	Reverse Battery Protection	20	V
V_{GE}	Gate-Emitter Voltage	± 20	V
I_{CM} *Note* 1	Collector Current (pulsed)	100	A
P_{TOT}	Total Dissipation at T_C = 25°C	200	W
	Derating Factor	1.6	W/°C
T_{stg}	Storage Temperature	– 55 to 150	°C
T_j	Operating Junction Temperature		

Table 2. Thermal Data

		Min.	Typ.	Max.	Unit
Rthj-case	Thermal Resistance Junction-case			0.625	°C/W
Rthj-amb	Thermal Resistance Junction-ambient			62.5	°C/W
T_L	Maximum Lead Temperature for Soldering Purpose (1.6 mm from case, for 10 sec.)		300		°C

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified)

Table 3. Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collectro-Emitter Breakdown Voltage	I_C = 1 mA, V_{GE} = 0	600			V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE}= 15 V, I_C= 20A, Tj= 25°C V_{GE}= 15 V, I_C= 20A, Tj= 125°C		1.9 1.8	2.5	V V
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE}= V_{GE}, I_C= 250 µA	3.75		5.75	V
I_{CES}	Collector-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = Max Rating,Tc=25°C V_{GE} = Max Rating, Tc=125°C			10 1	µA mA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20 V , V_{CE} = 0			± 100	nA
g_{fs} *Note* 1	Forward Transconductance	V_{CE} = 15 V, I_C= 20 A		15		S

Table 4. Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0		2200 225 50		pF pF pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V_{CE} = 390 V, I_C = 20 A, V_{GE} = 15V, (see Figure 2)		100 16 45	140	nC nC nC
I_{CL}	Turn-Off SOA Minimum Current	V_{clamp} = 480 V , Tj = 150°C R_G = 10 Ω, V_{GE}= 15V	100			A

Table 5. Switching On/Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $(di/dt)_{on}$	Turn-on Delay Time Current Rise Time Turn-on Current Slope	V_{CC} = 390 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15V, Tj= 25°C (see Figure 3)		31 11 1600		ns ns A/µs
$t_{d(on)}$ t_r $(di/dt)_{on}$	Turn-on Delay Time Current Rise Time Turn-on Current Slope	V_{CC} = 390 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15V, Tj= 125°C (see Figure 3)		31 11.5 1500		ns ns A/µs
$t_r(V_{off})$ $t_d(_{off})$ t_f	Off Voltage Rise Time Turn-off Delay Time Current Fall Time	V_{cc} = 390 V, I_C = 5 A, R_{GE} = 10 Ω , V_{GE} = 15 V,T_J=25°C (see Figure 3)		16.5 115 38		ns ns ns
$t_r(V_{off})$ $t_d(_{off})$ t_f	Off Voltage Rise Time Turn-off Delay Time Current Fall Time	V_{cc} = 390 V, I_C = 5 A, R_{GE}=10 Ω , V_{GE} =15 V, Tj=125 °C (see Figure 3)		34 152 48		ns ns ns

Table 6. Switching energy

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Eon Note 3 E_{off} Note 4 E_{ts}	Turn-on Switching Losses Turn-off Switching Losses Total Switching Losses	V_{CC} = 390 V, I_C = 75 A R_G= 10 Ω, V_{GE}= 15V, Tj= 25°C (see Figure 3)		200 205 405		µJ µJ µJ
Eon Note 3 E_{off} Note 4 E_{ts}	Turn-on Switching Losses Turn-off Switching Losses Total Switching Losses	V_{CC} = 390 V, I_C = 5 A R_G= 10 Ω, V_{GE}= 15V, Tj= 125°C (see Figure 3)		400 365 765		µJ µJ µJ

(1)Pulse width limited by max. junction temperature

(2) Eon is the tun-on losses when a typical diode is used in the test circuit in figure 2. If the IGBT is offered in a package with a co-pak diode, the co-pack diode is used as external diode. IGBTs & Diode are at the same temperature (25°C and 125°C)

(3) Turn-off losses include also the tail of the collector current

3 Test Circuits

Figure 1. Test Circuit for Inductive Load Switching

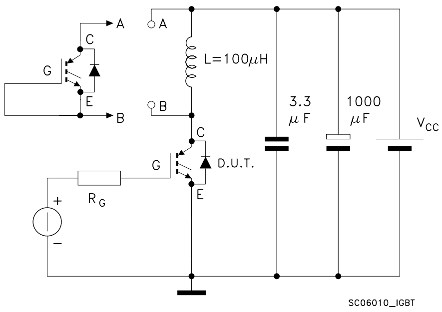


Figure 2. Gate Charge Test Circuit

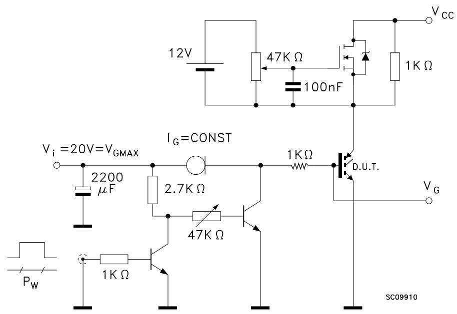
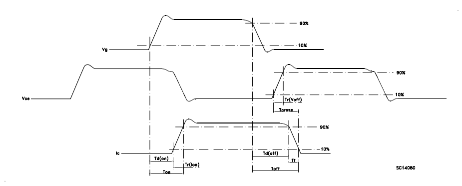


Figure 3. Switching Waveform

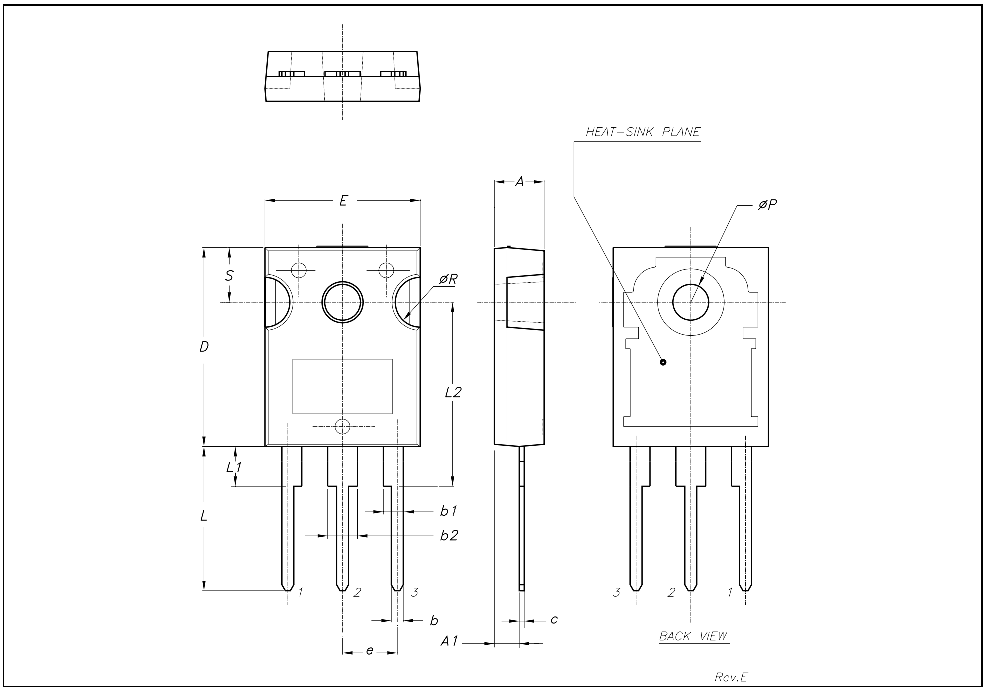


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



5 Revision History

Date	Revision	Changes
15-Sep-2005	1	Initial release.